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(*Türckheim* 1158). A species perhaps nearest to *S. Candelariæ* Benth., but very distinct.

PEREZIA NUDICAULIS Gray.—Specimens from Guatemala, Depart. Guatemala (*J. D. S.* 2364) show that the leaves are not “all runcinate,” some of them being simply ovate.

SENECIO KERMESINUS Hemsl. (*Gynoxys Hænkei* DC.)—Abundant material from Guatemala, Depart. Guatemala, alt. 5000 feet (*J. D. S.* 2356), shows that the original description of De Candolle needs emendation, as that was professedly drawn from imperfect specimens showing only the upper leaves. The lower leaves are coriaceous, rugose veiny, and more or less coarsely toothed. The heads also frequently have more numerous flowers. The plant is a very handsome one, climbing high over trees.

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Notes on North American Willows. VI.

M. S. BEBB.

A review of the willows of California.

More than ten years have elapsed since the publication of the second volume of the *Flora of California*. I wish to look over the account given therein of the willows, make some comments in the light of a better information, and correct mistakes.

1.¹ *SALIX NIGRA* Marsh.—This species, in its distribution from Texas southward and westward, presents two diverging lines of variation. Southward, along the Gulf coast, it passes by insensible gradations into the Mexican form of *S. Humboldtiana*. Westward, across the plains of New Mexico and Arizona, it takes on the character of var. *venulosa* Anders. with the lower leaves of the branches oblong, rather obtuse, often mucronate, later leaves at the tips of the branches attenuate-linear, all yellowish-green (at least in herbarium specimens) and veiny; mature capsules yellowish and long pediceled. Var. *Wrightii* And. is the same thing only representing (as it appears to me) an abnormal or retarded

¹ The numbers correspond with those of the *Flora of California*.

growth of the individual tree from which Wright's specimens were taken. Nevertheless, as Andersson insists upon the "short, thick, densely flowered aments," as essentially distinguishing this variety, it may be as well to avoid forcing a decision upon the scanty material at present available. *S. nigra* var. *venulosa* extends to the Sierra Nevada Mountains, but whether Bolander's specimens (leaves only), from Cache Creek near Clear Lake, show a reversion on the Pacific slope to something like the typical form of the species, or whether these were taken, late in the season, from the extreme tips of branches of var. *venulosa*, or whether it is not even more probable still that these long, narrow, sharply serrate leaves indicate an outlying northern station for *S. Humboldtiana* var. *oxyphylla* is a question that can receive no satisfactory answer until much more is known than we now know of the forms which *S. nigra* assumes in southern California and northern Mexico.

2. *S. LAEVIGATA* Bebb.—This fine willow reaches its fullest development in central and southern California. It is not known as an Oregon species, though collected by Mr. Joseph Howell, just south of the boundary line in Siskiyou county. Southward it takes on a serotinous mode of inflorescence, like other northern species which invade the tropics.

3. *S. LASIANDRA* Benth.—Local observers may be inclined to regard the more pronounced varieties as distinct, but if so I am unable to limit them. In a broad and comprehensive view the propriety of uniting the Rocky mountain and Pacific coast forms under one species and keeping this distinct from *S. lucida* of the Atlantic coast will, I believe, be conceded. *S. lucida* var. *macrophylla* Anders. referred "from the description" to *S. lasiandra* var. *lancifolia* I have since seen, not only in Dr. Lyall's (type) specimens, but in others from the Columbia River, in which the peculiarity described is exhibited in a still more marked degree. It is simply a broad-leaved, showy-flowered state of var. *lancifolia* with nothing whatever to indicate any particular affinity with *S. lucida*.

4, 5, 6. *THE LONGIFOLIAE*.—This group is distinctively American, clearly defined on every side, shading off into no other by variation, hybridizing with none. It is not connected with Old World forms by any synthetic type of the present or of any preceding period, but apparently was derived from the Mexican plateau at the close of the Tertiary.

In keeping with this view it finds its fullest development and greatest variation in form and stature on the Pacific slope. Eastward it declines in vigor and variability until on the Atlantic coast it is of rare occurrence from New Brunswick to the Potomac. Clearly marked as are the outer limits of the group it presents no lines of cleavage within by which it can be satisfactorily divided. No natural characters are found to coincide with such assumed distinctions, for instance, as the "linear lobes of the stigma," made prominent in the attempt to separate *S. sessilifolia*. Each portion after sub-division remains as heterogeneous as was before the aggregate group. It may be possible, by emphasizing first one character and then another, as these are found to predominate in the different forms, to designate a number of sub-species and varieties; but so bewildering and intangible is the reticulated intergrading that the difficulty of segregation seems only to be heightened by every fresh acquisition of material.

7. *S. CORDATA* Muhl.—No American willow has a wider distribution than this, from the Gulf States to California and northward in the interior to the Mackenzie River, and perhaps none other—not even excepting aggregate *S. longifolia*—presents more the appearance of a "congeries of species in the making." It differs from *S. longifolia* however in being, of all our willows, the one which hybridizes most freely with others and this implies that even where actual hybridity can not be proven it is more or less affected by association with other willows in different portions of its wide area of distribution.

8. *S. LASIOLEPIS* Benth.—Ten years ago this species was known to the writer only from Californian specimens. Even at that time three dominant lines of development were recognized, but these have since been found to lead out to such widely divergent extremes as would certainly be admitted as distinct species were it not for the intergrading. The most remarkable of these, exhibiting the var. *Bigelovii* in its farthest departure from the typical *lasiolepis* of southern California, is sent to me by Mr. C. V. Piper, from near Seattle, Washington: leaves obovate, oblong or oblanceolate, coarsely and irregularly repand-serrate, 2 inches wide by 4–7 inches long; aments as thick and copiously silky with long hairs as those of *S. Hookeriana*! As if *S. lasiolepis* were not already overloaded with aberrant forms we have to mention still another, provisionally referred only, found by Prof. Greene on

Santa Cruz Island. Unfortunately only the leaves were obtained. These are clothed beneath with a dense velvety, *persistent tomentum*. The character "filaments more or less united at base" should be more distinctly emphasized: it is really quite constant and will often serve to identify staminate specimens unaccompanied by leaves.

9. *S. FLAVESCENS* Nutt.—The name was adopted at first from Nuttall's description but I have since seen specimens named by Nuttall himself which confirm beyond all question the identity of the species. The time-honored name of the Flora Boreali-Americana, *S. Scouleriana*, will probably always be retained for the Pacific Coast forms which differ most widely from the type, but as this difference is observed almost wholly in the form of the leaves and as the leaves of the type specimens of *Scouleriana*, in the Hookerian herbarium are really those of *S. Sitchensis*, we are obliged to acknowledge a certain inconsistency, for which we find excuse in a desire to perpetuate among the willows of the N. W. Coast the name of the early explorer. This is another polymorphous species, which would be more faithfully reported if broken up into a series of varieties.

10. *S. MACROCARPA* Nutt., var. *ARGENTEA*—This beautiful little willow, with its silvery-silky capsules and foliage, and twigs overspread by a delicate glaucous bloom, may be regarded as a marked variety of the typical *S. macrocarpa* Nutt. of the Columbia River valley. An intermediate form has been connected by Mr. Patterson in the mountains of Colorado. As has already been shown (BOT. GAZETTE vol. x. p. 221) Anderson transferred Nuttall's name to a single specimen, from Hudson's Bay, in the Kew Herbarium, and then redescribed (essentially) the Oregon plant under the name of *S. Geyeriana*.

11. *S. SITCHENSIS* Sanson.—Following either the analytical key or the subordinate grouping of the species, the solitary stamen now known to be constantly characteristic of *S. Sitchensis* would carry this in all its forms, over to no. 19, *S. Coulteri*—and rightly so: for while *S. Coulteri* represents nothing more than an abnormal development of *Sitchensis*, the species itself, in virtue of the single stamen, the long, slender, flexuose aments and peculiar vesture and veining of the leaves, must become the type of a new group (*SITCHENSES*) and be removed from its present setting. It was a mistake to arrange the little willow "collected on a high mountain

near Donner Pass" by Dr. Torrey, as a variety of *S. Sitchensis*. Similar forms occur from British America southward to Utah and California—mostly in the Rocky Mountains, all seeming to belong to one species for which *S. pellita* Anders. is the oldest name; unless this is found to be anticipated by the still older and very obscure *S. Drummondiana* Barratt. Furthermore the very interesting question whether this is a mountain equivalent of the coast *Sitchensis* remains to be demonstrated when we know the staminate aments. Why these have eluded so many collectors is a mystery! Drummond's specimens are without staminate flowers to begin with and although in recent years some of our best collectors in the West have, at my request, endeavored to secure specimens which would complete our knowledge of the species, their efforts have been, thus far, of no avail.

12. *S. LEMMONI* Bebb.—This appeared abundantly, and in great diversity of form in Mr. Lemmon's collections, but has not been further made known as a Californian plant. It has been found since, however, by Mr. Cusick in the mountains of eastern Oregon at an altitude of 4,000 feet.

13. *S. AUSTINÆ* Bebb.—This must be held in abeyance. The leaves described belong to *S. Lemmoni*, and in some (though not all) of the specimens staminate aments of *S. lasiolepis* were intermixed. There yet remain the fertile aments not identifiable with any willow of the Pacific Coast region as at present understood. Leaves to match these will, I apprehend, be found to be of the *phylicifolia* type and the emended species, I hope, may continue to bear the name; but how long shall we have to wait for the painstaking local observer who will collect flowers and fruit, and finally foliage from the same plant?

14. *S. BREWERI* Bebb.—Beyond all comparison this is the rarest and most obscure of North American willows. Only in a remote degree related to any species of the region in which it was found, in fact representing a group otherwise unknown throughout the length and breadth of the Western Continent, found but once and after the lapse of more than ten years still known only from that one meager collection—surely we have presented here every indication of a species verging close on extinction.

16. *S. CALIFORNICA* Bebb.—In the first paper of this series mention was made of a group of willows, intermediate as it

were between *S. glauca* and *S. cordata*, distributed over the alpine regions of the Sierra Nevada and Cascade Range, and of which *S. Californica* constituted the southernmost member. Within a year or two past the collections of Piper and Smith, on Mt. Rainier and of the Macouns—father and son—in British Columbia, have shown that *S. Barclayi* Anders. known heretofore as a species of the Alaskan coast, is the northernmost representative of the series. A further consideration of this group will be made the subject of a separate paper.

17. BROWNII Bebb, var. PETRÆA (Anders.). More variable in the Sierra Nevada than in the Rocky Mountains, and including *S. tenera* Anders. Andersson first named one of Dr. Lyall's Cascade mountain willows *S. phlebophylla*, and under this name the specimens were sent out from Kew. Afterwards he restricted the name *phlebophylla* to a species of high arctic distribution and re-named Lyall's plant *S. tenera*. Watson (Bot. King's Exped., p. 326,) finding one of his willows from the Uintas, 10,000—11,000 feet altitude, agreeing perfectly with the Lyall specimen in the Gray herbarium adopted the name which he found on the label, not suspecting—as, indeed, why should he?—that the Lyall plant had been made, later, the type of *S. tenera* and that the arctic species was exclusively arctic.

18. *S. MONICA* Bebb.—Were I to receive to-day the poor, stunted specimens upon which this doubtful species was founded they would go into an already well filled cover marked “undetermined” and there repose until something more definite could be known about them. But *S. Monica* is no longer subject to the whim of its author. What is it? Possibly a form of *S. chlorophylla* And. This is known to occur on Mt. Adams and the higher summits of the Cascades and has also been collected by Prof. L. F. Ward in the Wahsatch mountains at 8,000–11,000 feet altitude. It is rather remarkable than otherwise that it has not been found on the peaks of the Sierra Nevada in forms about which there could be no uncertainty; but until this is done, the expediency of adding the species to the state flora on the evidence afforded by the poor, battered specimens named *Monica*, is very questionable. For the very narrow scale and the bracts at the base of the staminate ament seem opposed to any such determination; nor can *Monica* be a starved, alpestrine form of *Californica*, for this is known from almost the same locality and its

identity unmistakable. On the whole it seems best that a species of such questionable validity should be dropped.

To the list of California willows, as known ten years ago, not a single addition has been made, though it is highly probable that *S. rostrata*, *S. vestita* and *S. reticulata* will be found in the Sierra Nevada; and *S. Hookeriana* (known to occur abundantly along the coast of Oregon down almost to the boundary line) may be confidently looked for at the mouth of the Klamath river.

Rockford, Ills.

Notes on the flora of the St. Croix region.

E. G. HILL.

The Dalles of the St. Croix and the neighboring rapids are a piece of scenery very attractive to one seeking the beautiful and picturesque in nature. They are formed by a belt of trappean rocks of the copper-bearing series which crosses the river in this region, making several ridges from 200 to 300 feet high. Softer sandstones of the Potsdam or Cambrian formation, mingled with conglomerates and shales at the points of contact, are laid down upon the trap in horizontal strata, or abut against the sides of its uplifted beds, clearly showing their unconformability. Through these rocks the river has worn a deep gorge, and by a series of rapids and low falls rushes along between bluffs descending rather steeply as wooded slopes. On the Minnesota side of the stream the bluffs recede from its banks far enough to leave a nearly level spot on which stands the lower part of the village of Taylor's Falls. On the opposite slope, in the state of Wisconsin, lies the village of St. Croix Falls. In the midst of the rapids the river is spanned by a bridge at a point where it becomes quite narrow at the head of a defile, making it easy to cross to either side. For some distance below the bridge the water rushes on over the sloping rocks in impetuous swirls, then makes a sudden bend and glides on with comparative placidity between cliffs from 100 to 200 feet high. The walls of these cliffs are either vertical or nearly so. The Dalles are properly that portion of the gorge beginning at the bridge, and furnish much the most imposing part of the scenery. It con-